



MiniContac

(June 1998)

Manual

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Part number 106047

Table of contents

Introduction	4
Products supplied	5
Safety regulations	6
Description of the machine	7
Connections diagram.....	8
Electrical connections.....	8
Description of the individual containers	9
The operating panel	11
Main switch	11
Display panel and keypad.....	11
Cathode connection.....	11
The MiniContac operating menu.....	12
The MiniContac process menu	13
Setting up	16
Description of operating procedure	17
Maintenance and servicing	20
Machine.....	20
Baths	20
Waste disposal	22
Appendix	23
Through-hole plating record	23
Inspection report.....	24
Declaration of Conformity	36
Safety Data Sheets	37

Introduction

Dear Customer

May we congratulate you on your choice of the LPKF MiniContac system for through-hole plating in the laboratory.

This is the simplest system for galvanic through-hole plating to use in terms of the number of baths and production steps that we know of on the market. The process requires no specialist knowledge of chemistry or galvanizing.

Nevertheless, as with all galvanizing systems, the instructions in the operating manual must be followed carefully, otherwise there is a significant danger of a bath being damaged to such an extent that it can no longer be used.

In particular we would like to draw on our experience and bring to your attention the following possible errors:



- Do not allow the temperature of the baths to drop below 20°C (overnight, for example). The machine should always be kept at room temperature.
- Pay particular attention to careful rinsing. Under no circumstances should residues from one bath be allowed to get into the next bath. You must also rinse the circuit board holder carefully after use.
- Do not use steel wool or similar to clean circuit boards. Even the tiniest particle of metal is enough to destroy a bath.
- Always keep the baths covered, in other words, keep them as clean as humanly possible. This will ensure them a long lifetime.
- Ensure that drillings are technically perfect. Please observe the drilling parameters.
- Ammonia and chlorine vapours must not be allowed to escape into the room.
- An air extraction system can be installed over the machine but there must be no draft created over the baths.
- A ventilation system must not be installed over the baths.
- We recommend that you receive a basic training from our subject expert. This will provide you with tips and expertise for your entire circuit board production process.

We are certain that by following these notes and the instructions that follow precisely you will achieve reliable through-hole plating and will be satisfied with the LPKF MiniContac system in all respects.

Products supplied

The following are supplied with the LPKF MiniContac in addition to the machine itself:

I. **LPKF MiniContac:**

- 2 Phosphorised copper anodes
- 2 holders (1 with electric connection, 1 without electric connection)
- 4 covers (for containers 1, 3, 4, 5)
- this manual

II. **Chemicals**, sufficient for one year's normal operation:

Precleaning solutions:

GLANT 100 PK
 SPORER 200 PK
 ACTIVATOR 300 PK
 COPPER PLATER 400 PK

Through-plating:

GLANT 100
 GLANT 100 CONCENTRATE
 SPORER 200
 SPORER 200 CONCENTRATE
 ACTIVATOR 300
 COPPER PLATER 400
 SHINE

Not included in the materials supplied:

- Distilled water
- Squeeze bottle
- Mixing container
- Container for disposing of spent chemicals

Safety regulations



The user must have read this manual, paying particular attention to the safety instructions printed in bold, to ensure safe working with this system.

- **Never reach into the machine when it is running.**
- **Avoid all contact with the fluids.**
- **Never prepare or eat food while operating the machine.**
- **Wash your hands after operating the machine.**
- **Wear suitable protective clothing when filling or draining the machine.**
- **Never drink the fluids.**
- **Do not allow any of the fluids to escape when working on the machine.**
- **Always ensure that there is sufficient fluid in the first container (Glant 100) to prevent the heater system running dry. Risk of fire.**
- **Modifications carried out on the machine by you may jeopardize the safety of the machine and are not covered by the terms of the warranty.**
- **Please note that some materials can produce toxic gasses during processing. Obtain information on this from your materials supplier.**
- **Always work in rooms with ventilation or air extraction.**
- **Please follow the instructions given on the containers and/or separate safety leaflets when using chemicals.**
- **Only use chemicals for the purposes for which they are intended.**
- **Keep your workplace clear.**
- **Observe safety instructions.**

Description of the machine

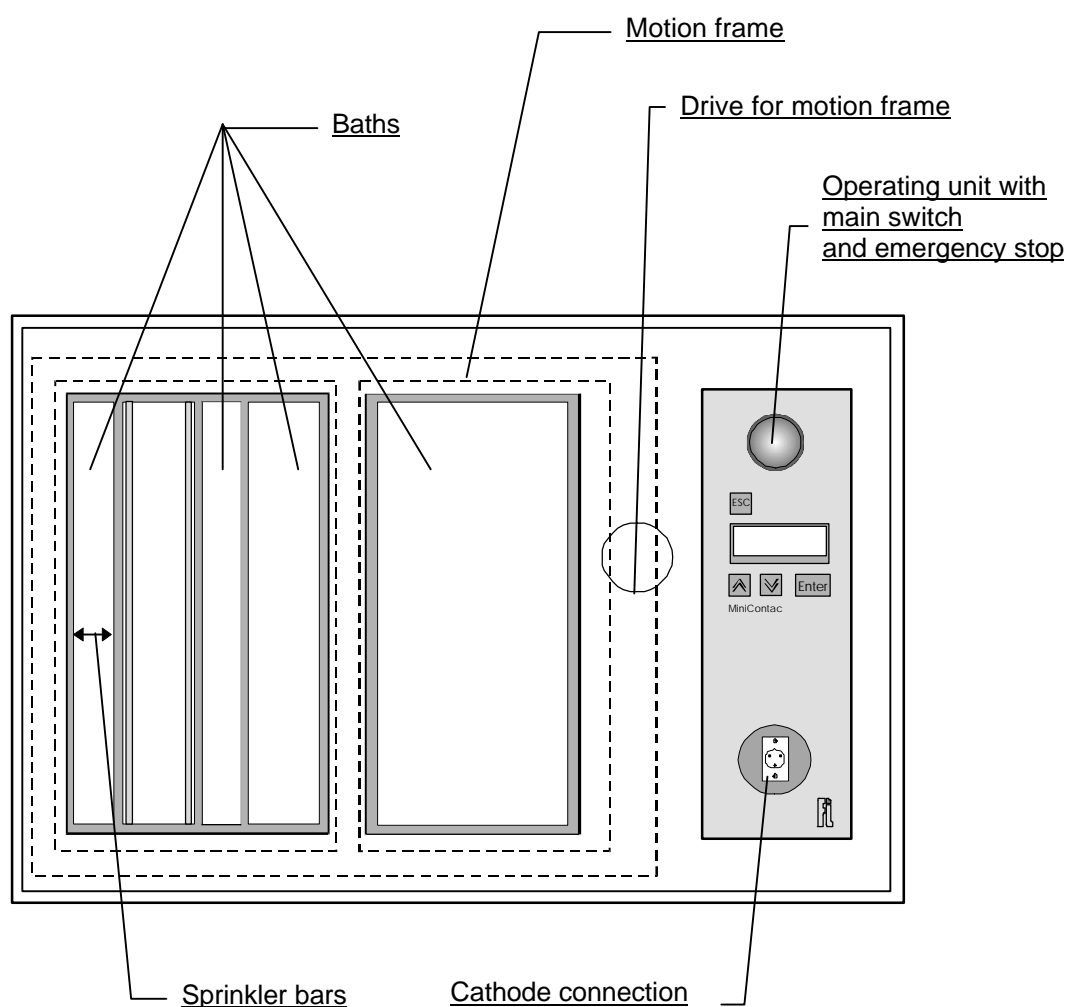
The machine consists of a stable plastic casing with working containers for the baths and their associated motion mechanism, the operating unit, the control unit and the circuit board holders.

The operating unit containing the main switch is located on the right-hand side.

The control unit in the switch box (on the right-hand side below the operating unit) contains the heater control, the drive for the frame motion and the rectifier.

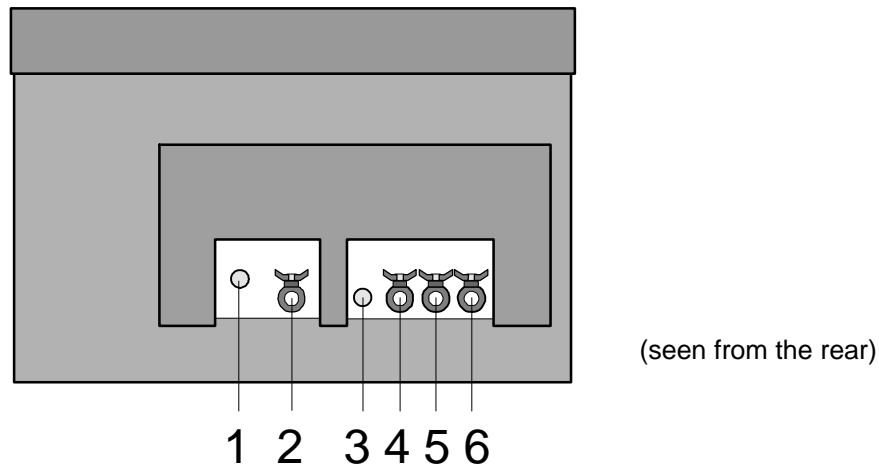
The water inflow and outflow ports and the drain for the containers are mounted on the rear.

The dimensions of the machine are: approx. 750 mm x 505 mm x 500 mm (W x D x H).



(seen from the top)

Connections diagram



- 1 Water inlet $\frac{3}{4}$ "
- 2 Drain valve for container 5
- 3 Water outlet $\frac{1}{2}$ "
- 4 Drain valve for container 4
- 5 Drain valve for container 3
- 6 Drain valve for container 1

Water enters by a $\frac{3}{4}$ " hose and leaves by a $\frac{1}{2}$ " hose.

The drain valves have connection adapters for 3" and $\frac{1}{2}$ " PVC hoses.

Electrical connections

The machine can be run on either 230 V 50 Hz 400 VA or 115 V 50 Hz 400 VA.

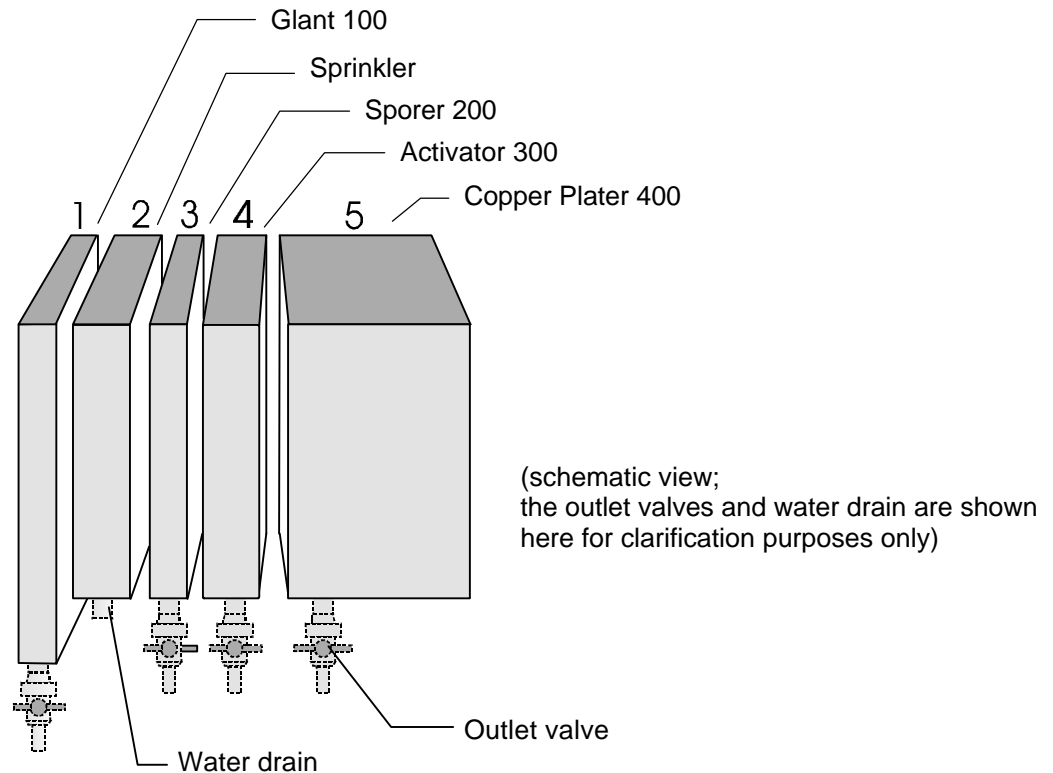
Any switchover must be performed at our factory.

Power is supplied via a power cord with shrouded contacts.

The fuse is located on the control board in the switch box.

The anodes in bath 5 are permanently connected to the rectifier fitted in the control unit via a contact rail while the circuit board holder (circuit board = the cathode) is connected to the cathode connection on the operating unit via the cathode cable.

Description of the individual containers



Container 1:

Degreasing and drilling preparation

Solution:	GLANT 100
Dimensions:	approximately 30 mm x 360 mm x 275 mm (W x L x H)
Volume of reagent:	approximately 2.7 litres
Heating:	approximately 58 °C
Frame motion:	Lift approximately 15 mm
Drainage:	via the outlet valve
Container cover:	yes

Container 2 :

Sprinkler rinsing

Dimensions:	approximately 60 mm x 360 mm x 225 mm (W x L x H)
Drainage:	into the drain
Container cover:	No
Two sprinkler bars in the shape of drilled tubes are fitted on the right and left at the upper edge for rinsing the circuit board.	

Container 3 :

Preparation

Solution:	Sporer 200
Dimensions:	approximately 30 mm x 360 mm x 235 mm (W x L x H)
Volume of reagent:	approximately 2.3 litres
Heating:	none
Frame motion:	Lift approximately 15 mm
Drainage:	via the outlet valve
Container cover:	yes

Container 4:

Activation

Solution:	Activator 300
Dimensions:	approximately 60 mm x 360 mm x 235 mm (W x L x H)
Volume of reagent:	approximately 4.5 litres
Heating:	none
Frame motion:	Lift approximately 15 mm
Drainage:	via the outlet valve
Container cover	yes

Container 5:

Copper plating

Solution:	Copper Plater 400
Dimensions:	approximately 165 mm x 360 mm x 235 mm (W x L x H)
Capacity:	approximately 12.5 litres
Heating:	none
Frame motion:	Lift approximately 15 mm
Drainage:	via the outlet valve
Container cover	yes

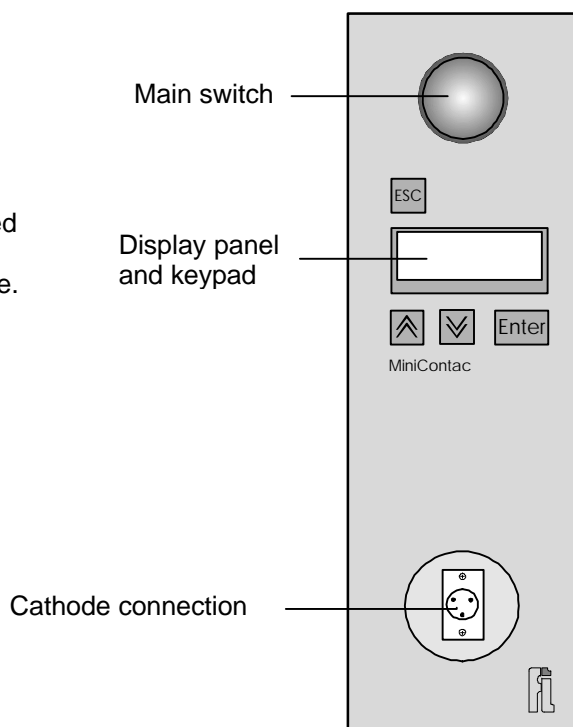
Two copper rails are fitted in the container to hold the two phosphatized copper anodes.

The operating panel

Main switch

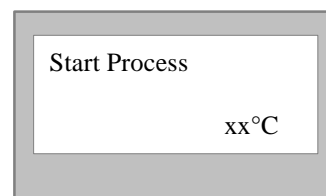
The power supply to the machine by is switched on by turning the main switch in the direction of the arrow while pulling it up at the same time. This switch may also be used as the **EMERGENCY SHUT-DOWN** switch (by pushing the switch in).

The release number of the software installed appears in the display when you turn on the main switch and the heating is turned on.



Display panel and keypad

The display panel shows the status or the process step reached together with the current temperature of the first chemical bath.



The **ENTER** button is used to confirm entries or to advance process steps (menu steps of the input menu).



These two buttons are used to configure the process parameters such as the time spent in the baths, the level of current for the copper plating bath or surface area of the circuit board.



Press the "up" arrow button to increase the value and the "down" arrow button to lower the value.

The **ESC** button cancels an entry or a process step and returns you to the previous menu item.







Cathode connection


The (circuit) board holder is connected to the cathode cable on the cathode connection.

The MiniContac operating menu

The operating menu for the control system is displayed once the machine has been switched on (by turning and pulling the main switch).

The version number of the software currently installed in the control unit appears in the first display.

Use the  or  buttons to navigate through the menu items, the  button to select a menu item, and the  button to deselect a menu item and to go up one level.

Use  to call up the start menu.

These are the individual menu items:

Start Process

Sprinkler on

Sprinkler off

Setup

Default Setup

Power Down

The through-hole plating process menu is called up using ***Start Process***. Through-hole plating is described in the following section.

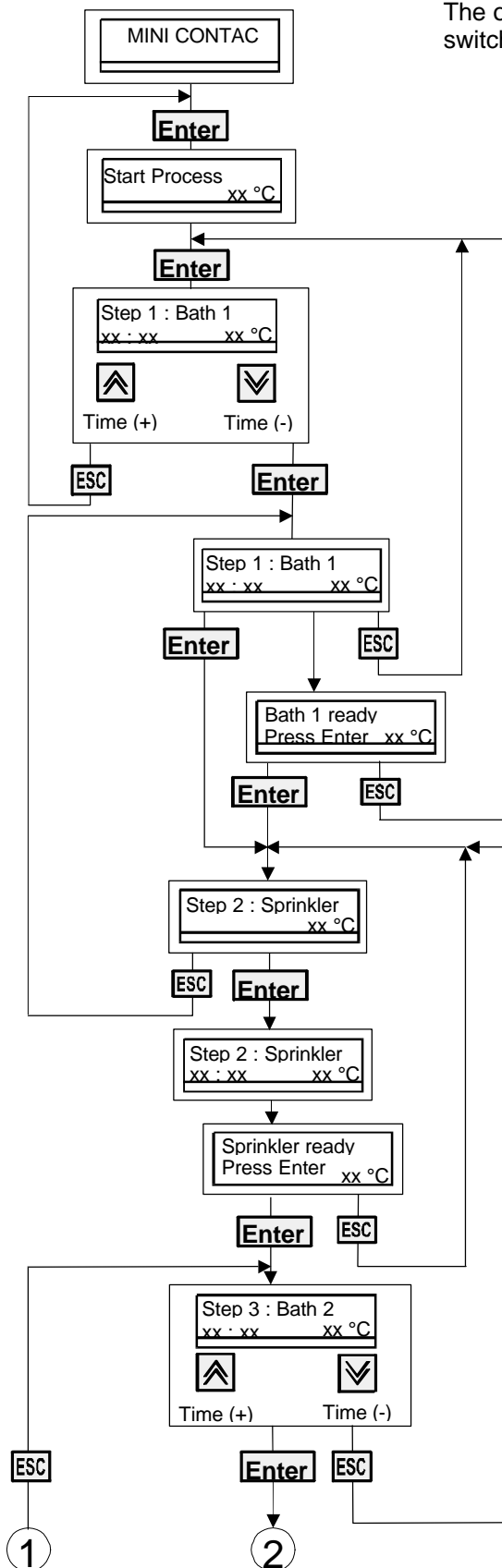
The sprinkler system selected is switched on and off using ***Sprinkler on*** and ***Sprinkler off***. Please note that the sprinkler system must be switched off manually in this instance. The sprinkler equipment cannot be switched off automatically.

The values for the time, date, menu language and temperature of the first bath are selected from ***Setup***.

Default Setup is used to revert to the factory settings.

Power Down is used to place the machine in standby mode.

The MiniContac process menu



The operating menu is displayed once the machine has been switched on (by turning and pulling the main switch).

Use **Enter** to call up the process menu

Start Process

Pressing the **Enter** button starts up the through-hole plating process.

Set the holding time for bath 1

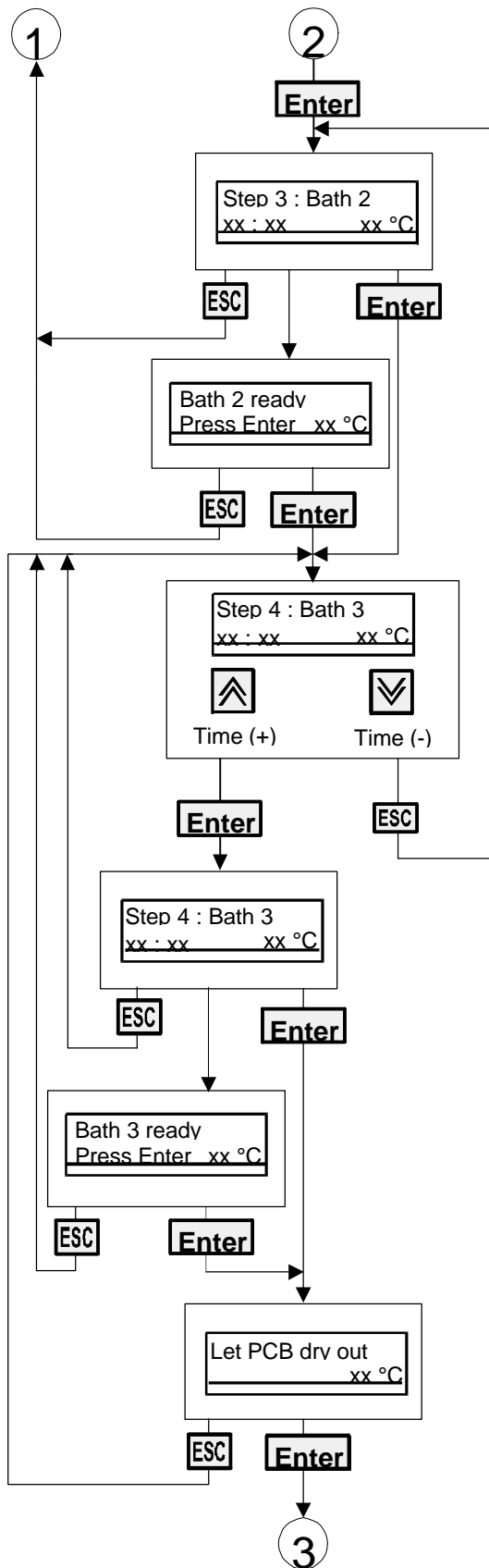
Process time for bath 1

The frame motion drive is switched on and the holding time for bath 1 is shown beneath this.

The motor switches off once the timer has run down to zero.

The sprinkler system runs for at least 30 seconds. The timer in the display is provided to give an overview of the time elapsed. It is not possible to cancel the sprinkler process before the time has elapsed.

Holding time for bath 2



The frame motion drive is switched on and the holding time for bath 2 is shown beneath this.

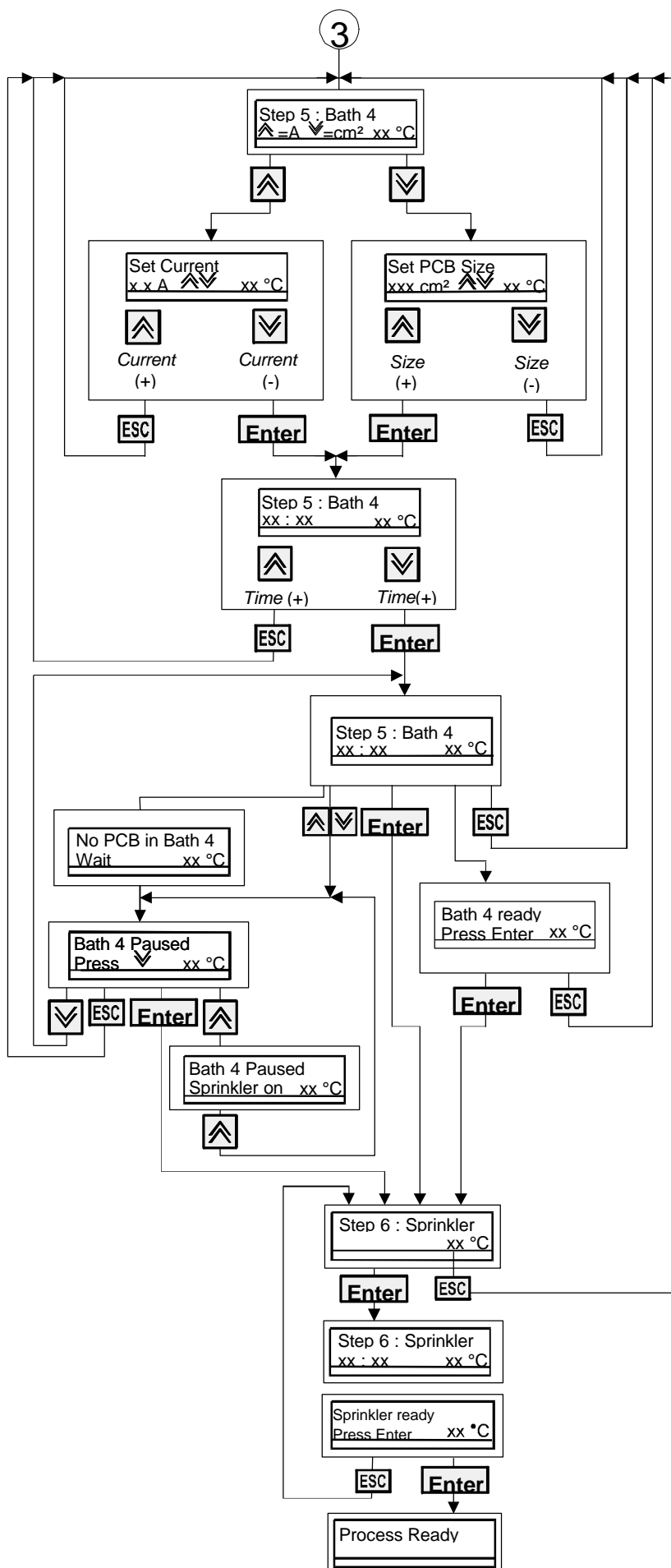
The motor switches off once the timer has run down to zero.

Set the holding time for bath 3

The frame motion drive is switched on and the holding time for bath 3 is shown beneath this.

The motor switches off once the timer has run down to zero.

A message is displayed instructing you to dry the circuit board now.



The level of current for the through-hole plating is set here. The current level can be set directly depending on the button pressed, i.e. the current level must be calculated in advance or the size of the circuit board can be entered.

Note: Enter the area of one side of the circuit board only.

Set the holding time for bath 4

The frame motion drive is switched on and the holding time for bath 4 is shown beneath this. The current for through-hole plating is also switched on. The MiniContac will pause after approximately 10 seconds if the control unit detects that no current is flowing.

The sprinkler system can be switched on and off while the machine is "paused".

The sprinkler system runs for 30 seconds.

End of the process

Setting up



Caution

It is imperative that you observe instructions in the safety data sheets for GLANT 100, SPORER 200, ACTIVATOR 300 and COPPER PLATER 400. These must be fixed to the machine so that they are clearly visible.

1. Clean any impurities from the anodes completely using acetone, then scrub the anodes using scouring powder and water until they are bright and rinse off thoroughly so that no residue is left on the anodes.
2. Clean the containers thoroughly using a sponge and plenty of clean water.
3. Now rinse out with plenty of water.
4. Next fill up with the precleaning solutions and leave to work for some time (at least 12 hours):

GLANT 100 PK	in	Container 1
SPORER 200 PK	in	Container 3
ACTIVATOR 300 PK	in	Container 4
COPPER PLATER 400 PK	in	Container 5
5. Heat up container 1 (Glant 100 PK) once during this period (to approximately 58°C) and allow to cool again.
6. The baths must be moved or agitated from time to time. To do this you should clamp the board material into the circuit board holder and switch on the frame motion (MOTOR).
7. The precleaning solutions can now be drained into their original containers via the outlet valves and returned to the chemicals supplier for disposal. Make sure that the outlet hoses are completely drained.
8. The containers are now ready and can be filled with the actual through-hole plating chemicals.

GLANT 100	in	Container 1
SPORER 200	in	Container 3
ACTIVATOR 300	in	Container 4
COPPER PLATER 400	in	Container 5
9. Make sure that the baths are filled to just (approximately 5 mm) below the circuit board holder.
Replace any lost fluids as specified in the maintenance and servicing instructions.
10. Heat up container 1 to 58 °C and agitate all the baths for approximately 1-2 hours.
11. The chemicals must have been in the MiniContac container for a minimum of 12 hours before commencing through-hole plating.



Caution

Always make sure that the first bath is sufficiently topped up. Top up with distilled water if necessary.

Description of operating procedure

Circuit boards must only be drilled with hard-metal drills suitable for drilling board material. They should fall within the drilling parameters which you can obtain from the machine manuals or the tool libraries in *BoardMaster*.

You may only use FR4 material as the board material.

1. Ideally you should use FR4 with a 5 µm or 9 µm copper coating (depending on availability). This material only needs rinsing to clean the drillings as it is protected by a copper film.

You will need to deburr the circuit board after drilling and brush or scrub the surface with, for example, artificial fleece (not with steel wool) if you are using a board material without a protective film, for example 18/18µm FR4. Rinse the circuit board thoroughly with water, paying particular attention to the drillings.



Caution	Never blast clean with compressed air. Any oil residues could destroy the chemicals.
----------------	--

2. Set the temperature of the first bath in the operating menu (Setup).
Temperature = 55-60°C
Call up the process menu and set the holding time for bath 1.
Holding time = 10-15 minutes
3. Clamp the circuit board in the holder and send the circuit board into **Container 1** (GLANT 100).
The frame motion is switched on by pressing **Enter** in the process menu and the holding time is shown beneath this.
4. Rinse off the circuit board **thoroughly** in **Container 2** (sprinkler rinsing).
Press **Enter** to start up the sprinkler system.
The circuit board must be rinsed off **immediately** it has been treated in the GLANT 100 bath to ensure that the degreasing chemicals do not harden.
To do this, move the circuit board up and down about 15 times or at least until the rinsing system switches off. Make sure that the circuit board mountings are also rinsed off to prevent the transfer of chemicals.
5. Once the circuit board has been thoroughly rinsed, send it to **Container 3** (SPORER 200). The holding time for bath 2 should be set for this under the process menu:
Holding time = approximately 2-3 minutes, (temperature = approx. 20° C) and the sequence is continued by pressing **Enter**.
This bath serves to neutralize the rinse water.
6. Keep circuit boards in the SPORER 200 Bath for approximately 2-3 minutes and then, **without rinsing first**, send them to **Container 4** (ACTIVATOR 300).

Note :	Steer the ACTIVATOR 300 before you put the circuit board into the bath.
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The holding time for bath 3 should be set for this under the process menu:
Holding time = approximately 10-15 minutes, (temperature = approx. 20 °C) and then restarted by pressing **Enter**.
The circuit boards need to be moved to rinse out the drillings.
The menu prompts you to dry the circuit board when the holding time expires.

7. Let the circuit board drip off completely after removing it from the bath.

Now leave the circuit board to **dry thoroughly**. This can be done using hot air, for example, or by waiting until it is dry.
Make sure that the drillings are free from chemical residues.





Caution Never blast clean with compressed air. Any oil residues could destroy the chemicals.

8. Remove the copper film if you are using FR4 material with copper film.
9. Gently rinse off board material without a protective film with distilled water over the spray tank. Then pat dry using a lint-free cloth very carefully so as not to wipe the activator out of the drillings.
10. Now set the current level for the copper plating using the  and  buttons. You can have the current level set automatically for each menu item by entering the size of the circuit board or by specifying the current for through-hole plating yourself.
The current level can be determined automatically by pressing . Enter the area of one side of the circuit board only. The program doubles the area automatically and sets the current level at approximately 1 ampere/100 cm².
You can specify the current level yourself by pressing .
Please note that you must calculate the area of the circuit board which is being immersed in the *Copper Plater 400* bath.

The current level is calculated as follows:

A current level of 1 ampere per 100 cm² surface area is required.
Board material of size A4: 200 mm x 300 mm = 60,000 mm² = 600 cm²
Surface area = front side plus reverse side = 600 cm² x 2 = 1,200 cm²
Current to be set = 12 A

11. The circuit board holder must be connected to the cathode cable (**negative**) **before** sending the circuit board to **Container 5**.
12. **Only now** can you immerse the circuit board **immediately** into **Container 5 (COPPER PLATER 400)**.
The process time for bath 4 is set under the process menu and started by pressing . The control unit will detect if a circuit board has not been immersed in the bath because there will be no current flowing. The MiniContac will pause after approximately 10 seconds and the process can be repeated by pressing .
13. The circuit board should be removed after 20 minutes and checked to see that all the drillings have been copper plated.
Now quickly re-immerses the circuit board.
Always keep the cathode cable connected to the holder when doing this.
Leave for a further 60-90 minutes' plating.

Copper will be deposited at a rate of approximately 0.2-0.3 µm per minute depending on the temperature of the bath, the current level, the size of the circuit board and the quality of the chemicals used. Thus approximately 12-18 µm of copper will form in sixty minutes.

Please note that the values given for the potential copper thickness are the approximate values that can be deposited using a machine such as the LPKF MiniContac under laboratory conditions.

You will have to through-hole plate several test circuit boards and use micrographs to determine the actual wall thickness if you need to obtain precise data on the thickness of copper deposited in the drillings.

You can begin through-hole plating the circuit boards themselves once you have determined the parameters for the wall thickness you require.

We recommend that you use the parameters specified by us to obtain satisfactory through-hole plating.

14. The following message will appear once the holding time for bath 4 has expired:
Bath ready, Press Enter.
The motor for the frame motion remains switched on and the current level is reduced to 5 % of the set value.
15. Use the **ESC** button to undo these actions and to restart through-hole plating in bath 4 or to remove the circuit board.
Always allow the circuit board to drip off **completely** over the bath.
16. Through-hole plating is terminated using **Enter** and the sprinkler system in Container 2 is started up. The sprinkler system always runs for 30 seconds. It cannot be shut off until this time has elapsed.
Move the circuit board back and forth in the sprinkler system (Container 2) approximately fifteen times, or rinse the circuit board at least until the flow of water stops.
17. Pressing the **Enter** button once more terminates the through-hole plating process.
18. Now dry the circuit board, preferably in hot air. This should be carried out as quickly as possible to prevent oxidation of the copper in the drillings.

The water used for rinsing is neutral to slightly alkaline and can be disposed of via the normal sewerage system (***see the Expert's Report in the Appendix***).

Note:	The quality of the surface finish on the circuit board may be poor and the life of the chemicals will be reduced if too high a current is used.
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Maintenance and servicing

Machine

The machine itself is maintenance-free.

It is important that you cover up the baths immediately work is completed to prevent contamination.

The machine must be carefully cleaned from time to time and must be kept clean.

Baths

Container 1

Degreasing

Product: **Glant 100**

Cover the container during breaks in working.

Fluid lost through evaporation can be replaced with distilled water.

We recommend making up the bath once a month with fresh **GLANT 100 concentrate** and distilled water.

Do this by draining the bath through the outlet valve into prepared disposal containers, taking care to ensure that the fittings are also empty.

The new mix should be made up in a container reserved for mixing.

The mixing ratio for a bath with a capacity of 2.7 litres is:

Glant 100 concentrate	5%	equivalent to	135 ml
distilled water	95%	equivalent to	2.57 litres

Container 2

Sprinkler rinsing

Clean limescale deposits from the nozzles at regular intervals.

Container 3

Preparation

Product: **Sporer 200**

Cover the container during breaks in working.

Fluid lost through evaporation can be replaced with distilled water.

We recommend making up the bath once a month with fresh **SPORER 200 concentrate** and distilled water.

Do this by draining the bath through the outlet valve into prepared disposal containers, taking care to ensure that the fittings are also empty.

The new mix should be made up in a container reserved for mixing.

The mixing ratio for a bath with a capacity of 2.3 litres is:

SPORER 200 concentrate	2.5%	equivalent to	58 ml
distilled water	97.5%	equivalent to	2.24 litres.

Container 4

Activation

Product: **ACTIVATOR 300**

Cover the container during breaks in working.

The bath is very sensitive and requires careful working procedures.

The tiniest amount of contamination, such as drops of *GLANT 100*, *Copperplater 400*, ferrous metal chips, or similar, will eventually cause the bath to fail.

It is irrelevant whether the bath is used or not.

The contents of the bath should be thoroughly mixed every 3-4 days at the latest if the bath is not being used.

Fluid lost can be topped up with *ACTIVATOR 300*.



Caution

Do never add water to the *ACTIVATOR 300* otherwise the through-hole plating will be out of order

The bath must be made up anew after a maximum of one year.

Make sure that the dispersion is thoroughly mixed when doing this.



Caution

Chemicals which have splashed onto the machine should be removed with soft cloths, not with abrasive materials. Otherwise the machine's plastic surface will be roughened, making it harder still to remove the chemicals.

Container 5

Copper plating

Product: **Copper Plater 400**

Cover the container during breaks in working.

Filter the chemicals from time to time (preferably using several coffee filter one inside the other).

Empty the bath into a canister to do this.

Do not rinse the black coating off the anodes as it important for their function.

However, you must make sure that particles of the black coating do not break loose and get into the bath.

Any such particles must be filtered out.

Fluid lost should be topped up with **COPPER PLATER 400**.

If the **COPPER PLATER 400** bath is still working satisfactorily but the copper plate appears dull or coarsely crystalline, this can be corrected by the addition of **Shine**.

Shine should be added at the rate of 0.4ml per one liter **Copper Plater 400** until the return of the forever brightness.

The bath must be made up anew after a maximum of one year.

Note:

The service life of the bath is approximately one year. These figures are only approximate and may vary as the life expectancy is influenced by such factors as careful working procedures and local levels of air pollution. There can therefore be no warranty of the chemicals' function after a certain period.



Caution

The machine should be started up again by mixing with test circuit boards if the baths have been changed or **SHINE** has been added.

Waste disposal

Do not allow spilt chemicals to enter waterways or the sewerage system.

The rinsing water generated by working processes can be disposed of via the sewerage system without concern (see the investigation report in the Appendix).

Never empty chemicals into the drain. Instead drain them into the containers provided for disposal and dispose of them at an authorized chemical processing plant.

The appropriate method of disposal (neutralization, hazardous waste disposal, chemical-physical treatment) can be found in the safety data sheets provided by the chemical manufacturer.

You must always check and comply with local and regional regulations governing the on-site and off-site disposal of waste.

Local and state regulations will always take precedence in the event of any conflict with our recommendations.

Through-hole plating record

Please keep carefully.

[illegible]

Copy as required and keep by the machine

Inspection report

Page 1/6



CHEMISCHES LABOR
DR. WIRTS + PARTNER
SACHVERSTÄNDIGEN GMBH

Prüfbericht

Gutachten, Beratung, Analytik

Bearbeitung von Schadenfällen im
Sachschaden- u. Haftpflichtbereich
an Betriebseinrichtungen, Gebäu-
den und Produkten

Umwelt- und Schadstoffanalytik
Boden, Wasser, Luft, Abfall,
Altlasten, Gefahrstoffe
Lebensmittel, Bedarfsgegenstände
Arzneimittel, Futtermittel

Auftrags-Nr.: 7 1696-P1C

Datum: 02.10.1997 / b

Seite: 1/3

Auftraggeber: LPKF, CAD/CAM SYSTEME GmbH, Osteriede 7, 30827 Garbsen

Auftragseingang: 04.09.1997

Ihr Zeichen: Sch

Objekt: Copperplatten 400

Prüfauftrag: Untersuchung von Abwasser

Kennzeichnung: Probe 1 : Spülwasser nach Copperplatten 400 Bad


Verpackung: in PE-Flasche mit Schraubverschluß

Probemenge: ca. 1 l

Probenahme: erfolgte durch den Auftraggeber

Probenanlieferung: am 03.09.1997, durch Postzustellung

Verantwortlich für den Prüfbericht:


- Dipl.-Ing. Wippich -

Die Prüfergebnisse beziehen sich ausschließlich auf die untersuchten Proben. Eine auszugsweise Vervielfältigung oder Veröffentlichung des Prüfberichtes darf nur mit schriftlicher Genehmigung der 'Chemisches Labor Dr. Wirts + Partner Sachverständigen GmbH' erfolgen.

GF: Dr. H.-D. Wirts · Peter Kastell
Amtsgericht Hannover HRB 54381

Volksbank Hannover e.G.
Kto. 0129984000 · BLZ 251 900 01

Telefon: 0511 / 52 50 71
Telefax: 0511 / 52 50 74

Rutenbergstraße 59
D-30559 Hannover

Translation of Inspection report, page 1/6

Chemisches Labor
DR. WIRTS + PARTNER
Sachverständigen GmbH

Inspection report

Date: 02/10/1997 / b

Order no.:	7 1696-P1C
Customer:	LPKF, CAD/CAM SYSTEME GmbH, Osterriede 7, 30827 Garbsen
Date Order received:	04/09/1997
Your ref.:	Sch.
Subject:	Copperplatten 400
Inspection:	Inspection of waste water
Identification:	Sample 1: Rinsing water after a Copperplatten 400 bath
Packaging:	Polyethylene bottle with a screw cap
Sample volume:	approximately 1 litre
Sampled by:	The customer
Sample delivered on:	03/09/97, by post

Inspection report prepared by:

Declaration of conformity

The results of the inspection exclusively to the samples tested. Duplication or publication of extracts from this inspection are permitted only with the express written permission of „Chemisches Labor Dr.Wirts + Partner Sachverständigen GmbH“.

Inspection report

Page 2/6

Seite 2/3
vom 02.10.1997
Auftrags-Nr. 7 1696-P1C



CHEMISCHES LABOR
DR. WIRTS + PARTNER
SACHVERSTÄNDIGEN GMBH

Probenkennzeichnung:	Spülwasser nach Copperplatten 400 Bad			
Labor-Nr.:	7 1696/1			
Aussehen:				
Farbe:	farblos			
Trübung:	keine			
Bodensatz:	ohne			
Geruch:	schwach unspezifisch			
PARAMETER	PRÜFVERFAHREN:	ANALYSEN-DATUM:	EINHEIT:	PRÜFERGEBNIS:
pH - Wert	DIN 38404 / 5	04.09.97		7,4
Meßtemperatur		04.09.97	°C	22,0
elektrische Leitfähigkeit ber. auf 25 °C	DIN 38404 / 8	04.09.97	µS/cm	780
Chrom	Graphitrohr-AAS	17.09.97	mg/l	< 0,005
Chrom VI	DIN 38405 / 24	17.09.97	mg/l	< 0,02
Kupfer	Graphitrohr-AAS	17.09.97	mg/l	< 0,0125
Nickel	Graphitrohr-AAS	17.09.97	mg/l	< 0,025
Zink	DIN 38406 / 22	05.09.97	mg/l	< 0,02
Blei	Graphitrohr-AAS	17.09.97	mg/l	< 0,0125
Cadmium	Graphitrohr-AAS	17.09.97	mg/l	< 0,0005
Quecksilber	DIN 38406 / 12	05.09.97	mg/l	< 0,0005
Arsen	Graphitrohr-AAS	15.09.97	mg/l	< 0,005
AOX - Gehalt	DIN 38409 / 14	18.09.97	mg/l	0,059
TOC - Gehalt	DIN 38409 / 3/1	08.09.97	mg/l	4,2
Mineralöl-Kohlenwasserstoffe	DIN 38409 / 18	12.09.97	mg/l	< 0,2

Zeichenerklärung:

u.B. = unter der verfahrensbedingten Bestimmungsgrenze
i. A. = in Anlehnung an

Translation of Inspection report, page 2/6

Sample identification:		Rinsing water after a Copperplaten 400 bath		
Laboratory no.:		7 1696/1		
Appearance:				
Colour:		colourless		
Opacity:		none		
Sediment:		none		
Odour:		faint, non-specific		
Parameters	Method of test:	Date of analysis:	Unit:	TEST RESULTS:
pH value:	DIN 38404 / 5	04/09/97	°C	7.4
Testing temperature:		04/09/97	µS/cm	22.0
Conducting capacity calculated at 25°C:	DIN 38404 / 8	04/09/97		780
Chrome	Graphite furnace AAS	17/09/97	mg/l	< 0.005
Chrome VI	DIN 38405 / 24	17/09/97	mg/l	< 0.02
Copper	Graphite furnace AAS	17/09/97	mg/l	< 0.1252
Nickel	Graphite furnace AAS	17/09/97	mg/l	< 0.0025
Zinc	DIN 38406 / 22	05/09/97	mg/l	<0.02
Lead	Graphite furnace AAS	17/09/97	mg/l	< 0.0125
Cadmium	Graphite furnace AAS	17/09/97	mg/l	< 0.0005
Mercury	DIN 38406 / 12	05/09/97	mg/l	< 0.0005
Arsenic	Graphite furnace AAS	15/09/97	mg/l	< 0.005
AOX content	Din 38409 / 14	18/09/97	mg/l	0.059
TOC content	DIN 38409 / 3/1	08/09/97	mg/l	4.2
Mineral oil hydrocarbons	DIN 38409 / 18	12/09/97	mg/l	< 0.2

Legend:

- = negligible
- = based on

Inspection report

Page 3/6

Seite 3/3
vom 02.10.1997
Auftrags-Nr. 7 1696-P1C



CHEMISCHES LABOR
DR. WIRTS + PARTNER
SACHVERSTÄNDIGEN GMBH

Untersuchungsbericht

Die zur Untersuchung übergebene Spülwasserprobe wurde wunschgemäß hinsichtlich einer möglichen Entsorgung über die Abwasserschiene chemisch geprüft.

Das Untersuchungsprogramm wurde in Anlehnung an die Einleitkriterien der allgemeinen Verwaltungsvorschriften des Wasserhaushaltsgesetzes - § 7a, zusammengestellt. Für die Spülwasserprobe wurden die Anforderungen nach Anhang 40 (Metallbearbeitung, Herkunftsbereich Pos. 1.1.7 = Leiterplattenherstellung) herangezogen.

Die im einzelnen erhaltenen Analysenergebnisse sind vorstehend aufgeführt.

Bei Auswertung der Meßergebnisse war festzustellen, daß die Spülwasserprobe (nach Copperplatten, 400 Bad) bezüglich der geprüften Parameter die Einleitrichtwerte einhielt.

Eine Entsorgung des Spülwassers über die Abwasserschiene sollte demnach möglich sein.

Translation of Inspection report , page 3/6

Inspection report

The sample of rinsing water supplied was submitted for chemical analysis as requested from the point of view of possible waste disposal through the waste water system.

The inspection schedule was set up following initial criteria laid out in general administrative regulations concerning the German Water Resources Law (article 7a).

The requirements specified in Appendix 40 (Metal working, sector of origin no. 1.17 = Circuit board manufacture) were used as the basis for the inspection schedule.

The complete results for the analyses are printed above.

Analysis of the results of inspection established that the rinsing water sample (after a Copperplaten 400 bath) meets initial guide values in respect of the parameters tested.

According to these results, it should be possible to dispose of the rinsing water via the waste water system.

Inspection report

Seite 4/6

07. Nov. 1997



CHEMISCHES LABOR
DR. WIRTS + PARTNER
SACHVERSTÄNDIGEN GMBH

Prüfbericht

Gutachten, Beratung, Analytik

Bearbeitung von Schadenfällen im
Sachschaden- u. Haftpflichtbereich
an Betriebseinrichtungen, Gebäu-
den und Produkten

Umwelt- und Schadstoffanalytik
Boden, Wasser, Luft, Abfall,
Altlasten, Gefahrstoffe

Lebensmittel, Bedarfsgegenstände
Arzneimittel, Futtermittel

Auftrags-Nr.: 7 1060-P2C

Datum: 24.06.1997 / b

Seite: 1/3

Auftraggeber: LPKF, CAD/CAM SYSTEME GmbH, Osteriede 7, 30827 Garbsen

Auftragseingang: 12.06.1997

Ihr Zeichen:

Objekt: Abwasserprobe der MiniContac-Anlage

Prüfauftrag: Untersuchung von Spülwasser

Kennzeichnung: Probe 1: Abwasser, Glant - 100 (Entfettung)

Verpackung: Proben 1: in zwei 1 Liter Kunststoffflaschen mit Schraubdeckel

Probemenge: ca. 2 Liter

Probenahme: erfolgte durch den Auftraggeber

Probenanlieferung: am 12.06.1997, durch Postzustellung

Verantwortlich für den Prüfbericht:

Wippich
- Dipl.-Ing. Wippich -

Die Prüfergebnisse beziehen sich ausschließlich auf die untersuchten Proben. Eine auszugsweise Vervielfältigung oder Veröffentlichung des Prüfberichtes darf nur mit schriftlicher Genehmigung der 'Chemisches Labor Dr. Wirts + Partner Sachverständigen GmbH' erfolgen.

GF: Dr. H.-D. Wirts - Peter Kastell
Amtsgericht Hannover HRB 54381

Volksbank Hannover e.G.
Kto. 0129984000 - BLZ 251 900 01

Telefon: 0511 / 52 50 71
Telefax: 0511 / 52 50 74

Rutenbergstraße 59
D-30559 Hannover

Translation of Inspection report , page 4/6

Chemisches Labor
DR. WIRTS + PARTNER
Sachverständigen GmbH

Inspection report

Order no.:	7 1060-P2C	Date: 24/06/97 / b
Customer:	LPKF, CAD/CAM SYSTEME GmbH, Osterriede 7, 30827 Garbsen	
Date Order received:	12/06/1997	
Your ref.:		
Subject:	Waste liquid sample from the MiniContac system	
Inspection:	Inspection of rinsing water	
Identification:	Sample 1: Glant – 100 (degreasing) waste liquid	
Packaging:	Sample 1: two one litre plastic bottles with a screw cap	
Sample volume:	approximately 2 litres	
Sampled by:	The customer	
Sample delivered on:	12/06/97, by post	

Inspection report prepared by:

<p>The results of the inspection exclusively to the samples tested. Duplication or publication of extracts from this inspection are permitted only with the express written permission of „Chemisches Labor Dr.Wirts + Partner Sachverständigen GmbH“.</p>
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Inspection report

Seite 5/6

Seite 2/3
vom 24.06.1997
Auftrags-Nr. 7 1060-P2C



CHEMISCHES LABOR
DR. WIRTS+PARTNER
SACHVERSTÄNDIGEN GMBH

Probe Nr.:				1	
Kennzeichnung:				Spülwasserprobe Glant 100	
Aussehen: Farbe: Trübung: Bodensatz: Geruch:				farblos keine ohne schwach unspezifisch	
PARAMETER	PRÜFVERFAHREN:	ANALYSEN- DATUM:	EINHEIT:	PRÜFERGEBNIS:	
pH - Wert	DIN 38404 / 5	17.06.97		7,6	
Meßtemperatur		17.06.97	°C	12,0	
elektrische Leitfähigkeit ber. auf 25 °C	DIN 38404 / 8	17.06.97	µS/cm	1140	
Chrom	Graphitrohr-AAS	17.06.97	mg/l	< 0,02	
Chrom VI	DIN 38405 / 24	17.06.97	mg/l	< 0,02	
Kupfer	Graphitrohr-AAS	17.06.97	mg/l	< 0,02	
Nickel	Graphitrohr-AAS	17.06.97	mg/l	< 0,04	
Zink	DIN 38406 / 22	17.06.97	mg/l	0,03	
Blei	Graphitrohr-AAS	17.06.97	mg/l	< 0,10	
Cadmium	Graphitrohr-AAS	17.06.97	mg/l	< 0,01	
Quecksilber	DIN 38406 / 12	20.0.97	mg/l	< 0,0005	
Arsen	Graphitrohr-AAS	20.06.97	mg/l	< 0,005	
TOC-Gehalt	DIN 38409 / 3	13.06.97	mg/l	1,9	
AOX - Gehalt	DIN 38409 / 14	16.06.97	mg/l	0,058	
Mineraloi- Kohlenwasserstoffe	DIN 38409 / 18	16.06.97	mg/l	< 0,2	

Zeichenerklärung

u. B. = unter der verfahrensbedingten Bestimmungsgrenze
i. A. = in Anlehnung an

Translation of Inspection report , page 5/6

Sample no.:	1		
Identification:	Rinsing water test Glant 100		
Appearance:			
Colour:	colourless		
Opacity:	none		
Sediment:	none		
Odour:	faint, non-specific		
Parameters	Method of test:	Date of analysis:	Unit:
pH value:	DIN 38404 / 5	17/06/97	°C
Testing temperature:		17/06/97	µS/cm
Conducting capacity calculated at 25°C:	DIN 38404 / 8	17/06/97	
Chrome	Graphite furnace AAS	17/06/97	mg/l
Chrome VI	DIN 38405 / 24	17/06/97	mg/l
Copper	Graphite furnace AAS	17/06/97	mg/l
Nickel	Graphite furnace AAS	17/06/97	mg/l
Zinc	DIN 38406 / 22	17/06/97	mg/l
Lead	Graphite furnace AAS	17/06/97	mg/l
Cadmium	Graphite furnace AAS	17/06/97	mg/l
Mercury	DIN 38406 / 12	20/06/97	mg/l
Arsenic	Graphite furnace AAS	20/06/97	mg/l
TOC content	DIN 38409 / 3	13/06/97	mg/l
AOX content	DIN 38409 / 14	16/06/97	mg/l
Mineral oil hydrocarbons	DIN 38409 / 18	16/06/97	mg/l

Legend:

= negligible

= based on

Inspection report

Seite 6/6

Seite 3/3
vom 24.06.1997
Auftrags-Nr. 7 1060-P2C



CHEMISCHES LABOR
DR. WIRTS + PARTNER
SACHVERSTÄNDIGEN GMBH

Untersuchungsbericht

Zur Untersuchung wurde eine Spülwasserprobe aus der Leiterplattenbearbeitung mit der „MiniContac“ übergeben. Die Wasserprobe sollte hinsichtlich der Entsorgung chemisch analysiert werden.

Für das Untersuchungsprogramm wurden die Anforderungen nach Anhang 40 (Metallbearbeitung, Herkunftsbereich Pos. 1.17 = Leiterplattenherstellung) herangezogen.

Die im einzelnen erhaltenen Analysenergebnisse sind vorstehend aufgeführt.

Bei Auswertung der Meßergebnisse war festzustellen, daß die Wasserproben 1 (Spülwasser Glant-100) bezüglich der geprüften Parameter keine erhöhten Werte aufwiesen. Die Einleitrichtwerte wurden eingehalten.

Translation of Inspection report , page 6/6

Inspection report

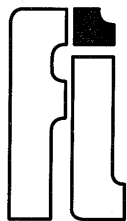
A sample of rinsing water generated in circuit board production on the „Minicontac“ was sent for testing. The water sample was submitted for chemical analysis from the point of view of disposal.

The requirements specified in Appendix 40 (Metal working, sector of origin no. 1.17 = Circuit board manufacture) were used as the basis for the inspection schedule.

The complete results for the analyses are printed above.

Analysis of the results of inspection established that water sample 1 (Glant-100 rinsing water) did not demonstrate any increased values in relation to the parameters tested. Initial guide values were met.

Declaration of Conformity



Franklin Industries n.v.

O.L. Vrouwestraat 31, 2800 Mechelen (Belgium)

DECLARATION OF CONFORMITY FOR FRANKLIN INDUSTRIES MINICONTAC

1. Manufacturer of the machine designated as:

Franklin Industries **MiniContac**, is company:

FRANKLIN INDUSTRIES NV
O.L.- VROUWESTRAAT 31
B-2800 MECHELEN

2. The machine designated as Franklin Industries MiniContac is a device suited for the throughplating of circuitboards. The serial number of the above mentioned machine is (see backside).
Further details about Franklin Industries MiniContac can be found in the User's manual.

3. The Franklin Industries MiniContac corresponds to the provisions of the EC recommendations 93/44 dated June 14, 1993 (see also appendix I of the recommendation).

4. Authorized signatory is:

Mr. Frank JACOPS
O.L. Vrouwestraat 31
B-2800 MECHELEN



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Safety Data Sheets

Safety Data Sheets

GLANT 100 PK

GLANT 100 CONCENTRATE

GLANT 100

SPORER 200 PK

SPORER 200 CONCENTRATE

SPORER 200

ACTIVATOR 300 PK

ACTIVATOR 300

COPPER PLATER 400 PK

COPPER PLATER 400

SHINE

